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ABSTRACT

This paper examines six alternative planning/implementation (P/I) models identified from a review of the literature and then discusses the empirical P/I models observed in operation at three field sites where groups are working to create new, nontraditional schools. Separate sections of the paper define and clarify the functions of P/I models, suggest criteria for judging good planning and implementation, discuss five underlying dimensions of P/I models, apply these dimensions to six "classic" P/I models, discuss the empirical P/I models observed at three field sites, and make some general predictions about the types of P/I models that are likely to be effective under particular conditions. Much of the paper is devoted to discussion of six "classic" P/I models; these include the "muddling through" model, the "natural development" model, the engineering/architecture model, the rationalized planning model, the simulation model, and the adaptive planning model. (JG)

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THINKING ABOUT HOW TO DO IT: ALTERNATIVE MODELS OF PLANNING AND IMPLEMENTATION OF NEW SCHOOLS*

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What does it take to envision and successfully create the special sort of social system called a new school? The answers range widely, from "Not much--any good principal can do it", to "God knows. I don't". At the Project on Social Architecture in Education, we have been studying this question for the past year and a half, interviewing people who have planned and created new schools, especially those with an innovative or non-traditional intent, visiting successfully-opened schools, and documenting intensively the planning and implementation work for two elementary school and three high school sites, two opening last fall and three to open this coming year.

During this study, we have become more and more interested in the underlying models of planning and implementation people use when they are creating new schools. These models are usually vague and implicit, rarely alluded to directly. Planners have told us, "You just have to go through it". They often cannot remember exactly how they proceeded, and frequently leave their upcoming strategies diffuse. Yet their models serve to guide (and constrain) planning and implementation very directly. For example, we visited a school where the implicit planning model was "Throw out all that's old and bad"; it opened for 200 high school students without a secretary, custodian or formal head, predictable chaos, and a six-week struggle before those "traditional" roles were in place. In another site where the model was "Specialists plan on paper, the principal implements in reality", the painstaking vision for an educational park was simply scuttled when the bureaucratically-hired principals appeared.

We are only midway through the work of our project, but we believe we can draw some preliminary conclusions about planning/implementation models. The remainder of this paper (1) defines, and clarifies the functions of, planning/implementation (hereafter P/I) models; (2) suggests criteria for judging "good"

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planning and implementation; (3) discusses five underlying dimensions of P/I models; (4) applies these dimensions to some "classic" models, such as "muddling through" and "adaptive planning"; (5) discusses the empirical P/I models "in place" in three of the sites we are studying; (6) makes some general predictions about the types of P/I models that are likely to result in effectiveness, given particular contextual conditions. Throughout, the paper will use illustrations from the project.

Planning/implementation models

First of all, "planning" and "implementation" are both activities intended to induce a desired future state of affairs and cannot be easily separated. It can be argued that "planning" involves activities like forecasting, envisioning the future, and constructing verbal or graphic pictures of a desired state of affairs, and that "implementation" requires the taking of action on the present and real world in order to shift it toward that state. We agree with Friedmann (1969) that "the idea that planning and implementation are two distinct and separable activities dies hard", and that the two activities are usually inextricably intermixed in reality. For our purposes, in studying the creation of new schools, we arbitrarily consider that "planning" begins when some legitimate body charged with "planning" begins work. "Implementation" in our terms begins when a manager for the new school is appointed, with the right to spend money. Both planning and implementation continue indefinitely, as far as we can see, although at some point (usually a year or two) most participants agree that the school has "settled down" and needs little further tinkering or adjustment. By that time, planning and implementation functions have usually receded to become a minor part of the life of the school.

In our project, we have put primary emphasis on key P/I actors, usually a group: a planning committee, the principal and his or her cabinet, the principal and faculty. Such a group (whose membership usually expands and shifts considerably over time) has a more or less clear planning/implementation model. A "model" of this sort can be defined as a meta-plan, a "plan for planning". It is in effect a background strategy guiding day-to-day operations, as planners and implementers work at their task--in this case, the task of bringing a new school into being. We can, of course, distinguish between the cognitive maps which planners and implementers have about their process of their work, and the models which are implicit in or inferrable from their actual behavior (cf. Argyris and

Schon's (1974) distinction between "espoused" theories and "theories-in-use". So far, looking at "theories-in-use" has seemed most fruitful to us.)

P/I models seem to have several important functions. First, they provide a more or less coherent mapping of the arrangements of people, time and actions seen as necessary in order to deliver the P/I group's final product: a functioning school. This mapping ordinarily has two major sub-areas: the design and development of the school *qua* school (will the schedule be flexible, will students have outside work experience, will teacher-pupil relationship be equalitarian?) and the acquisition of necessary resources and support from the environment (will the Board permit us to hire non-certificated teachers, how will we get the $25,000 for in-service training, will the community block the rezoning we know is necessary?) The first sub-area can be seen as essentially technical and internal to the school; the second is basically political and external, requiring environmental maneuvering and the exercise of influence strategies.

The second major function of P/I models is that they provide a more or less coherent base for building and maintaining the planning/implementation group itself, as a working system. For example, one planning group of teachers who had withdrawn in disgust from a deteriorated urban high school used its features as an "anti-plan": "Anything that was in City High, we almost automatically ruled out of consideration". Their shared disillusion drew them together.[1]

Criteria for "good" planning and implementation

If P/I models serve as a strategic support for planning and implementation activities, we cannot avoid the question of effectiveness. How can we tell whether a particular P/I model has "succeeded"? Our present answer to this knotty query has three components: goal-congruent implementation, problem-coping ability and stakeholder satisfaction.

Goal-congruent implementation. Good planning and implementation should result in a new school with features which key P/I actors would agree are congruent with what might be called the planners' meta-goals--their "vision of the new school. As we shall see, much adaptation and shifting usually--and desirably--

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[1] An associated view is suggested by Argyris and Schon (1974), who suggest that "theories-in-use" not only "specify strategies for getting what we want" (function 1 above), but help to maintain predictability and constancy in what they label "governing variables" (such as anxiety level, vitality, self-esteem). Though they focus on individual variables, we consider that the general point applies to the P/I system as a group.

occurs along the way, but good P/I operations should protect the original vision, not betray it or abandon it. The unanticipated outcomes of the P/I process (which will never be zero in number) whether positive or negative, should not conflict with the meta-goals of the enterprise.

Problem-coping ability. Any new school will have problems: situations which are "out of program" and require corrective action by implementers. So good P/I work should leave the new school able to cope with problems in such a way that they get solved with reasonable energy expenditures, stay solved, don't recur. In one of our sites, problems of all sizes ranging from teacher loss through budget cuts and student unruliness in the halls between classes seemed to get dealt with reasonably smoothly; in another, a principal and teachers who had hoped to solve the problem of parent opposition to open-space education used self-defeating methods (such as using hostile parents as aides) and failed: parental opposition mounted steadily and the school became a series of self-contained classrooms.

Stakeholder satisfaction. Finally, good P/I work should leave key figures related to the new school feeling reasonably good, satisfied that the enterprise has achieved (and is achieving) things important to them and their constituencies. This is probably a necessary (but certainly not sufficient) condition; in our view it would certainly have to be accompanied by retention of the original meta-goals, and problem-coping ability.

Critical dimensions of P/I models

Our study so far has suggested that there are some dimensions along which P/I models can vary, and that these may have critical importance for P/I effectiveness. Below, we describe and illustrate five of these, before applying them to a set of "classic" P/I models.

1. P/I group composition balance. The question of exactly who is involved in P/I work is a major dimension. Since P/I work involves both "internal (school-designing and creating) work, and "external" (resource-acquiring) action, any given P/I model ordinarily specifies the balance among four categories of persons: experts (good at the socio-technical aspects of the school); operators (people who will actually administer or teach in the school); gatekeepers (key people who control access to resources); and clients (parents, students) who may or may not serve a gatekeeping function, but can be defined as stakeholders. In one of our sites, a large urban high school sponsored by a college and the district board of education, the P/I model specifies that the planning work is done by gatekeeper representatives (from the college, the school district, and the union) who define themselves as experts. Clients are only marginally

represented. The planners divide their time between "designing" and worrying about politics, which they usually refer to a remote super-group of three gatekeepers with decision-making power. Occasional experts are imported (and resisted). This composition balance seems to lead to much micro-designing of aspects of the school, accompanied by massive uncertainty about the future.

In another site, an open-space elementary school, the implicit P/I model included only operators: the principal and teachers. No external experts, gatekeepers or clients were formally involved. The school has experienced massive school-community conflict, including charges of incompetence, parent withdrawal of students, and teacher mobilization against the principal, who they felt had violated his early collaborative intent. In effect, gatekeepers and clients forced their way into the implementation process (see Gold, 1976). It is hard to escape the view that a different composition of the P/I group would have yielded different consequences--positive or negative.

2. Directness of approach to the future. Uncertainty is probably the central feature of any P/I process. As Percival Goodman suggests, "To plan is to fail, since the outcomes of our deliberations cannot be known in advance". Or Stuart Sandow: "The future is the dark hole of the unknown not only because it has not been experienced, but because its component parts cannot yet be named". Some P/I models advise whole-scale attention to the future, using scenarios, guided fantasies, PERT charts. Others are less direct, suggesting only that a good deal of "what if?" thinking should go on, and contingency plans should be produced. At the lower end of the scale, some P/I models simply deny that the future is knowable or even important ("you just have to plan as you go along", "the principal will worry about that"), or back into it incrementally through a series of rationally-organized tasks ("first we'll do the goals, then the program, then we'll set up criteria for the principal hiring"). This dimension has important consequences: in one of our sites almost no "what if" thinking has occurred, and no visualizations have been made of the long-run future (or even of what a typical day in the school might look like): the implicit P/I model (which involves, essentially gatekeeper cooptation) specifies that "all that" will be dealt with by the principal when he or she is hired. The planners have looked closely at a similar school already in operation as a means of uncertainty reduction--but the question still remains: will the principal deliver what the planners hope for?

3. Design specificity. Some P/I models place a good deal of emphasis on thoroughly-worked-out plans, designs for the new school which are fully specified well in advance. Design specificity is always high when it comes to physical plant: builders need drawings. But when it comes to curriculum and social

structure, P/I participants in our sites turn out to vary a good deal on this dimension. At the low end, one planner told us: "Make sure it's evolutionary. Never write down the end plan. You'll get screwed every time". Another, more moderate, said,

> When you are actually starting new schools, that is where the real planning can start. What you have beforehand is just the basis. It is like the itinerary on a trip, like a musical score, in the sense of a statement of intent as to how you think things will go.

In another of our sites, we note that the P/I group is tending to produce only a rather rough sketch; this seems linked to the idea that ownership is central, and that cooptation of diverse gatekeepers or clients would be impossible if things got "too specific." In still another site, the P/I group is designing curriculum and materials so specifically that they will (the P/I group believes) be "teacher-proof" when the school opens.

Design specificity tends to be linked to underlying beliefs in rationality as a feature of planning, and to what might be called a commitment to thoroughness, completeness, even obsessiveness.[2]

Design specificity is also connected to the thoroughness and explicitness of the cognitive mapping the P/I group carries out in relation to its product: the school. Walton (1975), in a fascinating article describing the creation of a new industrial plant, reports that aiding the P/I group to surface and clarify their experience-based assumptions about such arcane matters as reward systems, decision-making structures, and autonomy of workers was extremely important for P/I success.[3] Our experience so far suggests that P/I groups for new schools

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[2] The question of the use of what might be called P/I "tools" is an interesting one, both in relation to the future-management dimension and this one. We have observed one P/I group so overwhelmed with multiple contingencies and uncertainties (budget, staffing, physical site, student population) that their work simply goes in circles. But in this group, and in most P/I groups we have studied, there is almost no use at all of supposedly well-known tools for managing uncertainty and complexity, such as scenarios, decision trees, cross-impact matrices, simulation, PERT charts, or even visual displays on newsprint of the content of group discussion. We do not know whether this is a function of perceived irrelevance, ignorance, resistance, or something else. One planner did tell us: "The best PERT charts are those that are done after the fact, because they can be seen to have described a reality which did in fact occur, but a PERT chart done before the fact rarely describes the event that actually occurs."

[3] Other approaches to this have been described: Blake and Mouton (1968) discuss "ideal strategic modeling", in which P/I members learn organizational dimensions from a review of Sloan's book My Years with General Motors, then specify the loadings on these dimensions they would like in the organization they are creating. We have also observed in sites both the "anti-plan" strategy, in which mapping proceeds in opposition to a known school, and a "reassurance" strategy, in which a known school is examined closely for its advantages and disadvantages.

usually have clear maps for the "technical" side of their work, but vague, unclear ones when it comes to the school as a social system.

4. Reflexivity/adaptiveness. In some P/I models, there is strong attention to data collection, both within the P/I group and outside it, accompanied by a self-analytic orientation, and the ability to adapt and alter plans to accommodate to internal and external data. In others, such an orientation seems minimal. At one of our open-space elementary schools, where the P/I group was faced with intense parent opposition, the principal agreed under pressure from the board of education to collect data on community attitudes, but the data were ignored (even though the teachers themselves had done the interviewing), and the original open-space plan was so minimally modified that community pressure mounted and led within a few months to self-contained classrooms with walls. We considered this ineffective P/I, since the original meta-goals were lost.

In many cases, it appears that data quality is crucial: data which flow from the direct experience of the P/I group (ex: process discussion of how things are going in the P/I group, a simulation, a visit to other sites, or preliminary experience with the first few weeks of the school in operation) are better than surveys, questionnaires, and the like.

Berman and McLaughlin (1974) have pointed out that the dimension of adaptiveness is relatively crucial for success in the implementation of educational change programs and (given the typical uncertainty we have described above) there seems little reason not to believe the same is true for new schools. See also Fullan's (1975) discussion of feedback as a determinant of curriculum implementation.

5. Planning-implementation linkage. As we have indicated, the functions of planning and implementation are not easy to separate analytically, or practically. But it does appear that P/I models exist which accomplish such separation de facto, and/or consider it desirable. In one of our sites, a large urban high school, the essential early planning was done by a single coordinator, who pulled together resources and designed the over-all program. She hoped to be the school's principal, but failed when the bureaucratic/political selection process was carried out. The school system's P/I model implicitly accepted such minimal linkage. (The planner in fact worked hard to accomplish linkage, by introducing the new principal to key resource persons at a cocktail party, proposing specific staff names for key positions, designing the staff training program and getting the forward budget and certain crucial equipment in place.) However, much of the implementation carried out only the "letter" of the original plans, missing the spirit (ex: a more equalitarian teacher-student relationship had been envisioned).

Extremely close P/I linkage through the medium of shared personnel does not always lead to effectiveness, it should be pointed out. In one site, a charismatic, visionary planner stayed on as a staff member of the new school, and created a great deal of conflict and polarization until he was forced out. In our open-space site which experienced such strong community conflict, planners (faculty and principal) became implementers; had key stakeholders--gatekeepers and clients--been involved in planning but not implementation, success might have been more likely.

Some classic planning/implementation models

Above, we have reviewed five critical dimensions of P/I models: P/I group composition balance, directness of approach to the future, design specificity, reflexivity/adaptiveness, and planning-implementation linkage. In this section, we examine six models drawn from a review of the literature on planning,[4] describe their loading on these dimensions, and point to their possible advantages and disadvantages in terms of effectiveness. Illustrations from our sites are given where relevant.

1. Muddling through. A good case can be made for the view that fully rational or comprehensive planning is inherently impossible; one cannot know the future, cannot encompass all feasible means to desired goals and weight their costs and benefits, cannot even get a clear fix on desired goals. In popular terminology, "muddling through" simply implies a mixture of improvisation, expediency, non-planning, and short-run coping (reactive planning).

More formally, Lindblom (1959) suggests strategies labeled "disjointed incrementalism" which do not require "full rationality" in planners. They involve considering policies which are only incrementally different from present policies, choosing ends (goals) that are achievable by existing means, focusing on a limited rather than broad set of alternative means, letting goals remain loose and diffuse, not trying to make tight linkages between goals and means, and adjusting policies incrementally via feedback from action.

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[4] This literature is extensive: Blum (1974) describes 47 different "modes" of planning, and cannot compress them into fewer than eight approaches. Yet Ozbekhan (1969) laments:

> Beyond the fact that it involves the future, and that the steps in terms of which it is described must be ordered in relation to some goal for planning, we have neither a general theory nor special theories of it, we have no widely accepted language that communicates its logic, no structure that organizes its predictive or explicatory propositions into an operational model; we do not even have such propositions. In sum, whatever it is that we call planning lacks that solid foundation from which it should be possible to strengthen and flesh out, to direct and evolve, to dispute and adjust the corpus of the practice itself.

Applying our dimensions to the "muddling through" model (either in the colloquial sense or the Lindblom usage), we can see that it tends to be low on expert membership in the P/I group, approaches the future very indirectly, deliberately leaves design vague, is high-adaptive, and usually deals (one would expect) pragmatically with the P/I linkage problem.

Most of our sites have a "muddling through" flavor in much of their P/I work, and the model has clear advantages: it stresses practicality, and squarely faces the facts that planners are incompletely rational and quite fallible, that means cannot be usually tightly connected to goals, and that unanticipated outcomes, as Smith and Keith (1971) have so clearly pointed out, are 100% likely.

Sieber comments (personal communication) on other advantages:

> The "muddling through" model shouldn't be dismissed. Apparently it wins wars. The only major war we've lost was run by McNamara, who gave us PPBS [the fully-rationalized Program Planning and Budgeting System]. Maybe it is planning itself..that kills new schools, because it creates division of labor and formal hierarchies, forecloses opportunities, squelches spontaneity and precludes the joy of improvisation. Perhaps the real question is: what makes schools successful in spite of planning? How, then, can we teach administrators (and their constituencies) to de-plan, to be unruffled by, if not to revel in uncertainty?

But "muddling through" also has problems and difficulties: it tends to limit planners in advance to goals and means which are only marginally different from (or better than) what they are replacing, and may encourage unimaginativeness rather than the spontaneity Sieber hopes for; goals themselves (including the crucial meta-goals) may go vague or get lost in the shuffle of expediency; and it can rather easily regress into "unplanning".

2. "Natural development". A second response to humans' limited rationality is that of denying that "planning" is necessary at all in any sustained sense.

In this view, a new organization gradually emerges from the day-to day interactions of those inhabiting it. One planner in our study said:

> The planning session that is most important is the planning that takes place after Day 1...our momentary exchanges over lunch, after school, before school, visiting a room, can be a kind of continuous building or modification. The original plan or "score" exists to be modified. Or it is like playing an instrument, as you play it you learn more about it, and as you play the thing you are playing, you develop notions about what would sound even better.

This model, implying a "doing it by doing it" stance, seems to load as follows on our dimensions. Operators are the key P/I personnel, the future is approached simply by working into it with a very short time horizon, design specificity only

appears at the moment of implementation, adaptiveness is at a maximum, and the question of P/I linkage in essence evaporates, since P and I are not seen as separate operations. (Note that the model is not really planless; it can perhaps be classified as a low-structure approach to what we call "adaptive planning" below: the new organization gradually emerges, shaped by feedback from successive stages of implementation.)

Some advantages of this model for the creation of new schools can be drawn from Miles' (1975) comments:

> This way of thinking produces, in effect, an actualized image of the future, rather than vague rhetoric about "what it might be like"; it enables a direct experience with satisfying, self-initiated inquiry. Because of the modest scale, success experience for individuals are more likely...the approach...is also directly focused on user satisfactions and user needs, and can be expected to tap sources of energy usually masked, or blocked, or held unavailable. (p. 208)

It seems likely that many smaller-scale "free schools" of the late sixties were created using this model.

This model tends to certain disadvantages: the strong adaptive stance can lead to opportunism and restriction to short-run coping strategies; the absence of experts and the refusal to be specific ahead of time about design can result in unimaginative, limited decisions about aspects of the school. More seriously, "natural development" as a model tends to focus primary attention inward, on the school as such, to the detriment of the serious political/strategic planning that is usually needed to obtain (and retain) resources from the environment. And "natural development" as a model may also encourage over-simplified cognitive mapping of the school as a social system. Cf. Beitz and Washburne (1974):

> Perhaps the simplest [method for decision-making] is having no structure --with decisions discussed and approved by school meetings of all students and adults.

We must patiently point out that that is a structure, and that school planners who conceptualize social system functions this vaguely will be in trouble.

This P/I model, being a sort of "unmodel" of planning, may well require, as did the free schools of the 60's, some sort of general ideology or shared value set to tie the P/I enterprise and the evolving school together. But ideology is not enough. Sieber (1975) suggests:

> An organizational planner is not a utopian dreamer...Organizational and wider social "realities" often come crashing down after awhile... because these realities were originally spurned by the "planners". They were hoping that by ridding themselves of bureaucratic mechanisms, the organic growth of a community would insure compliance and effort toward goals. But they overlook two things: (1) facilitative functions of bureaucratic arrangements (quick and dependable mobilization of physical

> and human resources, delegation of tasks, guarantees of compliance with members' role expectations, etc.), and (2) the embeddedness of the school in a larger social context...

One planner said:

> Getting it started was hairy. We threw out everything the Board did--curriculum, teacher credentials, school governance, school administration. The school opened in chaos. Our plan had been to cast out everything we didn't like from the established system...When the school started up... every idea we had was smashed. The hard, cold reality hit...great feelings of inadequacy. No one anticipated the degree of student dis-interest which we found. It was jarring.

3. Engineering/architecture. The engineer and the architect tend to have a roughly similar P/I model to guide their work.

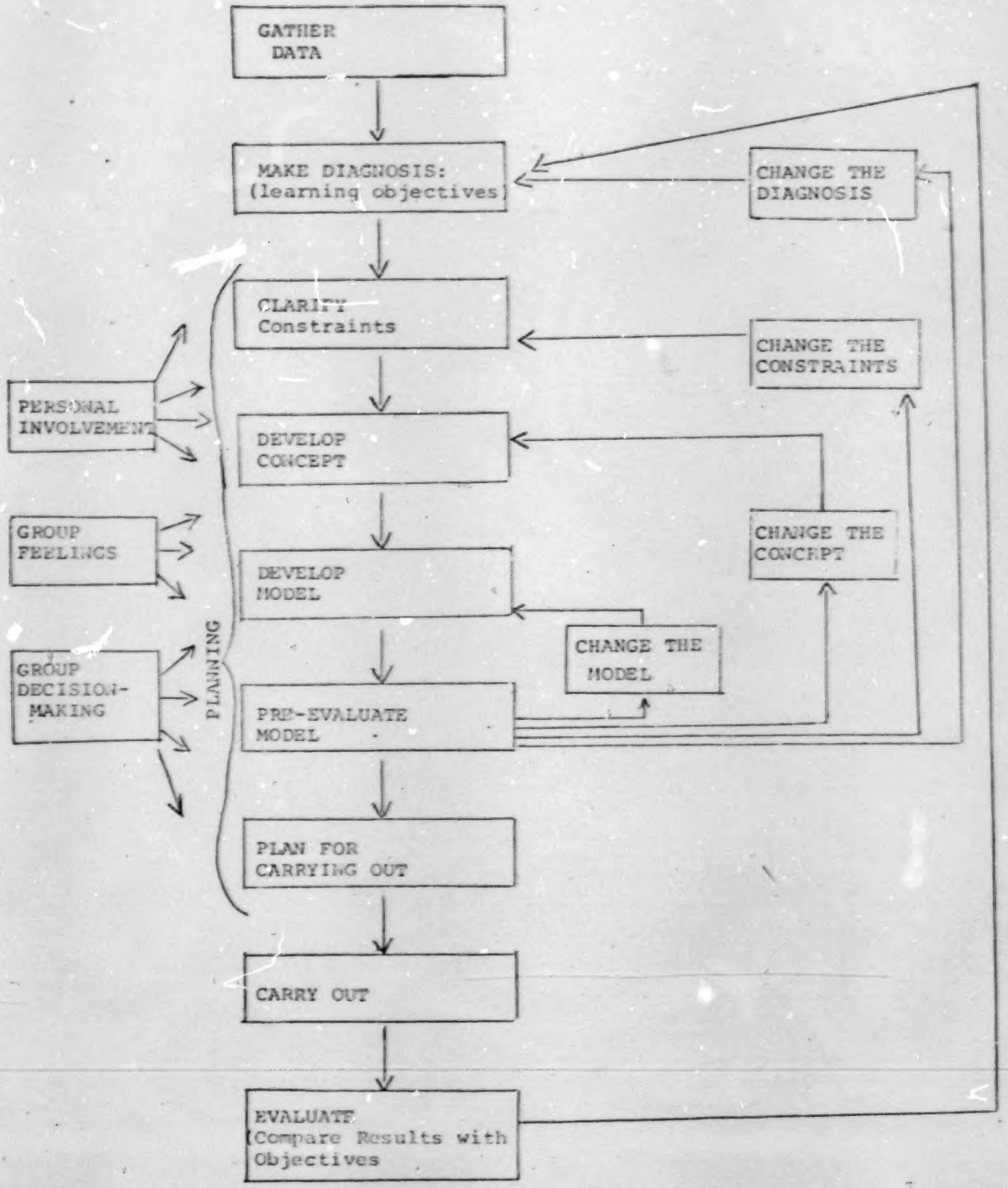
The engineer is usually given a relatively pre-set problem, with (if he asks the right questions) very clear requirements. The core processes are those of design, carried out by an expert: the engineer makes a creative, often ingenious set of combinations/permutations of known operating principles from science, and known properties of technology, working within clearly specified constraints. Some tinkering is usually needed at the implementation end, but the engineer's stock in trade is ingenious problem-solving. Fig. 1 shows a typical formulation of engineering design process, adapted by Miles to the special case of designing learning environments. The process is essentially one of iterative refinement, with provision for looping back to question or change decisions made earlier during the process, if impasses or difficulties are encountered. In this special case, where planning is often done by a group, feelings and decision-making processes play a powerful part (see left of Fig. 1).

Glegg (1969) provides a fascinating account, with many cases, of the engineering mind at work. He points out that the process includes not only logical/rational components, but strong inventive and esthetic ones as well. He suggests a long list of rules of thumb, many of which can be seen to be applicable to social-system design, such as

--avoid being conditioned by tradition, the familiar solution
--make "allies" of the material you are working with
--divide up the problem into segments, then integrate your various solutions
--don't despise the "untutored" inspiration (from the non-expert)
--design for continuity of energy flow
--avoid "overdesigning"
--assume that failure will occur
--be attentive to disguised assumptions in your conclusions about the problem
--design the cheapest solution (time, money, energy) that will work

Fig. 1 DESIGNING LEARNING ENVIRONMENTS:
a process outline

M.B. Miles
Jan. 1975



Though the label "social engineering" rouses many people's hackles, Lake (1972) reports success in applying the P/I model outlined in Fig. 1 to teach people the skills of designing and staging "temporary systems" (National Science Foundation summer institutes, in this case).

Like the engineer, the architect, as an expert, brings strong design emphasis to bear on a problem. The P/I model is somewhat less close-ended, perhaps, than that used by the engineer. The architect works closely with a client, assessing needs, making future projections, developing successive approximations of a plan which draws on technical experience, then supervising the actual building process.

The architectural metaphor is an attractive one: Perlmutter (1965) used it as a central organizing notion for describing the needed interaction between social scientists and their clients in the planning and "building" of new organizations (note, in passing, that Perlmutter considers the client to be the actual "builder" rather than assuming that a third party (as in physical architecture) will put the structure together).

Miles (1975), in discussing the creation of "teacher centers" as a new institution, suggests:

> ...the issue is not whether social architecture takes place, but how explicit it is, how willed it is, what the scale of effort is, the relative balance between de novo and "redesign" allocation of energy. The need is to design environments which are furthering to humans and their purposes, which enable authentic personal and group relationships while achieving personal and organizational purposes, and which are reasonably flexible and adaptable under stress. This task is not easy, and it is certainly not furthered by the pretense that "everything will happen naturally", the fantasy that "we can plan it out carefully all in advance, or the pious view that "we only need to coordinate our resources".

Dayal and Thomas (1968) took an essentially social-architectural view in their work with an Indian engineering corporation, working closely with their clients (the members of the firm) in diagnosing needs and building/rebuilding the organization via designing and re-negotiating role relationships.

Applying our dimensions, we see that both engineering and architecture make experts focal in the P/I process, with clients secondary. They approach the future directly by active envisioning of highly design-specific solutions. The engineer tends toward an adaptive style via iterative refinement; architects classically shift their vision little once the blueprints are ready. For the engineer, P/I linkage happens incidentally as he shuttles back and forth between the shop and the

drawing board; the architect, too, is the focal link (between the drawings and the builder).

The engineering model is strong on clarity, simplicity, and esthetic appeal. The difficulties, however, are not minor: Michael (1973) points to rigidity in goal-setting, resistance to feedback from the environment (which is treated as relatively invariant), and the engineer's frequent inability to back off and redefine the basic problem being addressed. An engineering view also tends toward the assumption that the parameters of the problem are well known (and, indeed, that the whole task can be seen as a "problem"). Finally, matters of implementation are likely to be slighted; the basic iterative process of designing may be mostly complete before the solution is put into effect.

The architectural view is strong on design, leads us to look for the esthetic aspects of putting together a new organization, reminds us that real people with needs will be living in the system being envisioned, emphasises that expertness is useful.

Against these advantages should be arrayed certain difficulties: the implication that rigid, stable structures are involved; the assumption that all the parameters of the materials (cost, stress-bearing capacity, etc.) are known; seduction toward relatively rigid plans ("the blueprint"); and the view that planning and implementation are necessarily carried out by different parties, with supervision by the more "expert". Physical architects are often noted for their arrogance, elitism, and avoidance of evaluation of their products; it may be that social architects could run the same risk.

4. Rationalized planning. This seems the simplest label for the P/I model which underlies a good deal of research and development work, approaches labelled "systems analysis", and the like. In one version, the model specifies that planning consists of a careful analysis of the tasks which the new organization is to perform, followed by the construction of a system of interrelated roles, procedures, etc. which will accomplish these tasks. Drucker (1974), and Galbraith (1973) describe this model for the case of designing industrial organizations; Herbst (1972) reviews it for schools.

A somewhat more comprehensive version of rationalized planning involves a series of rationally-guided steps: clarify goals; set priorities; set objectives; develop programs; evaluate programs; revise programs (Simon and Levin, 1973). A similar formulation is that of Conrad et al (1973): develop a planning process

("plan for planning"); develop data information system; establish goals; generate alternative means; assess projected consequences and synthesize means into an over-all plan; implement; adjust based on results. (For a detailed version of the same general model, see Corrigan et al, 1972).

The thought style which accompanies the model has been characterized by Friedmann (1967) as that of "bounded rationality". It involves the intent to be rational with respect to both goals and means, contingent on structures and processes in the social context of planning (ex: interest groups, political or bureaucratic opposition, information systems, etc.); he distinguishes this mode from both "unbounded rationality" (Utopian or ideological thought) and "extra-rational thought" (intuition, tradition, etc.).

Planners who are operating from a rationalized-planning model often seem to view their enterprise as essentially that of specifying a network of connected tasks arranged in chronological order; the tasks are then moved through, with necessary decisions made as each task is dealt with. This style has been characterized by Starr (1966) as a "fully-constrained planning system"; the issue is finding the shortest and cheapest path through the tasks, perhaps using a systematic analysis/display technique such as PERT. The environment is assumed to be relatively steady and predictable.

This way of considering planning need not be overly narrow and rigid; for example, the planning guide prepared by Goldstein (1972) for the use of Philadelphia school personnel is thoughtful, flexible, and comprehensive. Or the ideas about the creation of new schools proposed by Levin and Simon (1974) are certainly not "fully constrained". But they do assume a rough chronology of tasks: define the mission; get support, plan the setting and assemble resources; get started (open for students); assess state of the system; adjust toward stability; re-assess and replan for second year of operation. These task areas tend to alternate between (a) reflection (look at data, analyze, reach decisions about what to do); and (b) action (do something in the world).

Applying our dimensions to the rationalized planning model, we note that primary membership in the P/I group tends to go to operators and experts; clients and gatekeepers are less visible. The future is approached very directly, with much support from P/I technical "tools" like PERT charts. The design specificity is usually very high (although the striking thing about this model is the design specification of the P/I process, rather than its product). Adaptiveness varies considerably, depending on how good the planners have been at building in data

collection points and decision options into their charts. Finally, P/I linkage also varies in thoroughness, depending on the characteristics of the "plan for planning".

Rationalized planning has its advantages: it gets men on the moon, is in fact "rational", straightforward, thorough, deals with time as a scarce but manageable commodity, is superbly able to manage complexity. The emphasis on specific actions and decision makes for high clarity and economy of energy.

But this way of thinking about planning contains problems. It tends to take all goals (not just those at the "meta" level) as given, not mutable except in the very long haul. There is a tendency to treat goals and means as somehow separate, not mutually-influencing. More narrowly: it tends to constrain the consideration of means only to those "assumed" to be goal-contributory (to this, the rational developer says, "Of course!" and the visionary says, "But look at what you may be missing!")

P/I groups which focus on rational decisions as the output of their work may lose sight of the fact that (a) some actions during planning or implementation are not at all "willed", but are driven by non-decisional processes (for example, in Smith and Keith's (1971) account of Kensington School, no one ever explicitly "decided" that the faculty should present a "facade" to the hordes of curious visitors--yet much energy was consumed in doing so); (b) unintended outcomes of decisions are the rule, not the exception.[5] Perhaps most seriously, rational planning as a P/I model often focuses inward, on the technical aspects of the P/I task; the model poorly equips P/I workers for the rough-and-tumble of political encounter with their environment, where "systems" thinking begins breaking down rapidly in the face of diverse interests and goals, the Byzantine problems of building power bases and confronting one's enemies, and just plain irrationality.

5. Simulation. The next P/I model to be explored is that involving the creation of a system rather like the one the P/I group is aiming for, and the careful study of its properties. Explaining the need for simulation, Forrester (1969b) has asked:

> Why is it that our social systems (1) need planning; (2) do not accept planning; (3) are led into troubles of the kind that planning purports to alleviate?

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[5] The epigraph here comes from Gaddis' (1975) novel J.R.: "Life is what happens to us while we are making other plans."

His suggested answers are (a) planners tend to be intuitive (by which Forrester evidently means over-rational), missing the "counter-intuitive" nature of processes in social systems; (b) short-run consequences often degrade long-term intentions; (c) planners either focus on the wrong (non-key) variables or think they must alleviate pressures which should in fact be intensified for long-term success; (d) planners are isolated or powerless. These answers suggest the importance of being able to simulate the behavior of the system being designed, before it actually exists. Forrester's (1969a) view is instructive.

> Planning too often seems to be a process of arbitrarily setting a goal. The goal-setting is then followed by the design of actions which intuition suggests will reach the goal. Several traps lie within this procedure. First, there is no way of determining that the goal has not been set too low and that the system might be able to perform far better. Third, there is no way to be sure that the planned actions will move the system toward the goal. The history of social planning demonstrates that these hazards are real. The alternative is to examine the design of the social system, to understand the reasons for its behavior, and change its structure and policies to produce a system that operates as effectively as we can devise.

He suggests that good planning must be based on a "deep insight into the behavior of complex systems", getting past the symptoms of difficulty to the causes, and suggests that computer simulation--the creation and manipulation of a model of the system being planned for--is the most likely route to planning success, since key variables causing difficulty can be experimentally altered, and consequences examined before the "real" planning-implementation is done. Convincing exhibits of this style of work can be found in Forrester's 1969 book, Urban Dynamics, and in the Club of Rome's Limits to Growth study. At a more organization-specific level, Geisler and Steger (1962) describe a game-simulation approach, in which a new organization is simulated to speed up and clarify not only routine task performance, but goal definition and uncertainty reduction, using inductive learning to develop and revise the organization as it "proceeds" under compressed-time conditions.

One of our planners described his use of simulation this way:

> In a one-week experience, we had experiences structured around students actually being taught. Various people teaching and others not criticizing the teachers so much but trying to understand why students weren't learning, using videotape. We were preparing the teacher: are you willing to take a step back and look at yourself and what is going on in your own classroom? Can you develop the tools to constantly work on your own classroom curriculum in a way that will be an on-going, evaluation process? Then we would come out of that with

> a sense of direction for the curriculum, the kind of resources they would need, and fed that to an expert with experience in writing and putting new materials together.

Another planner said:

> You need practice in new kinds of behavior, moving from intellectualization to actual practice, then evaluating the conflicts, letting them rise and handling them. The difficulty of the whole planning stage is that as long as it's on paper, you avoid changing roles and working with people.

Using our dimensions, we see that the simulation P/I model characteristically focuses on operators, perhaps with the help of experts. It deals directly with the future by bringing a plausible version of it into the present. Design specificity may be quite high, as may adaptation. P/I linkage occurs directly during and immediately after the simulation activities, under optimal conditions.

Simulation is excellent for dealing with complexity; for preassessing the consequences of alternative policies or designs; for saving time; and (if the simulators are smart) for getting at core problems and causal linkages of an anticipated system. It also (as in the game-simulation approach) uses human intelligence about as well as it can be used in the disorderly, uncertain, complicated mess that is the real world.

Its difficulties are (a) avoiding the familiar "garbage in, garbage out" problem: the simulation design itself can be made useless by weak or unjustified assumptions at the input level--which may be invisible to planners until it is "too late" (i.e., the implementation decision has already been made); (b) the simulation may become so "real" that real-world data are ignored: (c) the question of "implementation" may still remain, even after "critical" or"causal" variables have been identified.

6. Adaptive planning. While most of the preceding models have provision for "evaluation" and adjustment late in the planning process, adaptive planning gives priority to feedback from actions, followed by redesign, from the very start. This concept is so familiar in the applied behavioral sciences that we might forget that it was not clearly formulated until 1947 by Lewin (Fig. 2): planning is a "spiral of steps each of which is composed of a circle of planning, action and fact-finding about the results of the action.

Fig. 2

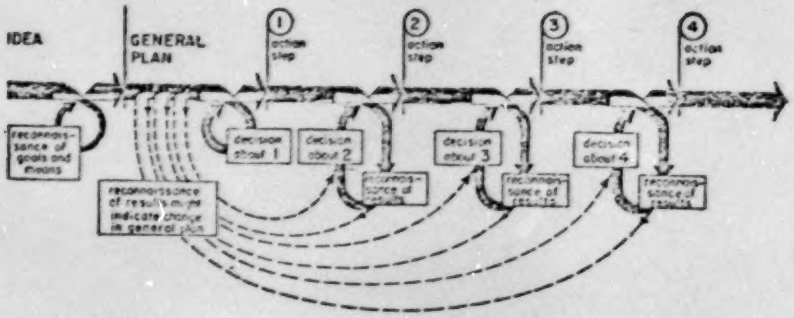

Fig. 2 Planning, fact-finding, and execution.

(from Lewin, 1947; published 1958)

The work of Levin and Simon (1974) minimizes what might be called grand designing in the creation of new schools, and suggests that each successive phase of planning (e.g., defining the purposes of the school) is followed by action (e.g., getting added planners and resource support) and then by reflection on that action, leading to new planning. They suggest, "Whatever is on paper will probably be changed anyway, and providing a systematic process for that change is, in our view, far more important than program pre-planning".[6]

Similarly, Herbst (1972) points out that in creating new schools uncertainty is very large:

> ...if we wish to create a democratic school or university organization, we cannot initially define in detail what this type of organization will look like and how it will function. We are given neither the relevant facts that define the existing situation, nor the necessary steps for implementation. (p. 183)

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[6] Compare Levine's (1969) comments on:

> ...the need to improve planning by recognition of the inexactitude of its results. Plans are never right in every detail, yet plans are frequently created and used on a basis which guarantees that they will work only if right in every respect. What is needed is a movement toward plans which are less sensitive to their own failure, plans which are pretty good even when some of the conditions are violated and some of the assumptions are changed. ...What is needed is something flexible enough to correct its own errors as it goes along and to allow a missed assumption or calculation to mean no more than a somewhat less optimum result. ...Finally, because plans are unlikely to work as foreseen, what is most needed is a kind of planning which attempts to guide tendencies in desired social directions rather than to design precise machinery or well-mapped roads to specific outcomes. The next big test for social planning is the design of systems which are likely to work in desired directions and are, as suggested above, relatively insensitive to their own failures. (pp. 514-15).

and suggests that the necessary stance is that of a learning process: diagnosing situation characteristics, discovering directions of change towards goals, evaluating action steps, and so on.

It may be argued that all this is "common sense", but in point of fact many planners seem to act as if their models are non-adaptive, and seek almost no data from first-cut actions to revise their plans. We have some evidence from our sites that more successful P/I groups have in fact used an adaptive planning model. One informant said:

> We began by planning the first two weeks of the semester; the next six weeks of the school were planned during those first two weeks of the school in actual operation.

Another:

> We were willing to have a constantly evolving process, which drives some people crazy. They want to know what you are teaching, how big is the school, and so on. We were willing to have a constantly evolving process. We had energy and we could deal with our mistakes.

But adaptive planning does not come easily: it requires good-quality data collection and feedback, and the attitude that reflexivity is crucial. A planner said:

> There is a tendency for the staff to speak with one voice, to miss out on critiquing what they are doing. Questions don't get raised about what is happening, people become 'such good friends'. Self-irony gets lost. It's really important to set up a mechanism for assessing what's happening in the school, especially at the student level.

Sarason's (1972) idea of an "external critic" who provides feedback to planners is a useful solution, and was in fact used by this planner.

If we apply our five dimensions, it is of course clear that the defining one for this P/I model is reflexivity/adaptation. P/I group membership tends toward involvement of operators, clients and gatekeepers (as data sources). The future is approached only as it becomes the present, in the form of information relevant to P/I revisions. Design specificity tends to be lower than in P/I models like rationalized planning and architecture/engineering. P/I linkage tends to be vigorous, with P/I problems minimal, since "implementation" is not conceptualized as a separate phase or "problem": planning has high flexibility and close contact with the reality of the evolving school. Thus systems built with an adaptive planning P/I model are in principle likely to be well suited for survivial in the environment they were constructed in, for, and from.

At its worst, adaptive planning can slip toward expedience. Though it specifies that courses of action toward a goal should be shaped as a result of feedback (and even that the goal itself may deserve some shaping or revision), the risk is that even meta-goals themselves may get abandoned, and that only the courses of action that "we now know will work" are pursued. Along with this, adaptive planners may find themselves denying the need for thoughtful design work, and drifting toward a "natural development" model, with its risks. One added comment may be useful: Sarason (1972) has pointed out, in effect, that adaptive planning is important not just because humans are fallible and because action must be informed by knowledge of results, but because planners' motivations for personal growth and development are a central and powerful force: the large energy investments required for the creation of new settings will only continue to be "worth it" if they serve to enhance and expand the creators' selves, and minister to their needs for stimulation and their curiosity about the world around them.

Furthermore, he suggests that most P/I members simply do not know what they are in for when it comes to the creation of new settings, and usually do not possess, at the start, all the understandings and skills they will need along the way. Adaptive planning ministers to those needs.

Michael (1973) goes further: unless planners can learn how to live with uncertainty, to "embrace error" rather than fear it, and to re-evaluate their own goals and values steadily, then serious planning of a long-range sort is not possible.

Planning-implementation models in our sites

Our excursion through six "classic" models may have helped to illuminate some general issues and clarify the dimensions proposed. We believe it may be helpful to describe the P/I models which appear to be in place in several of our sites. Some have been alluded to along the way.

Campus High. The P/I model for this experimental urban high school, built around collaboration between a municipal college and the local school district, has a number of interesting features. The P/I group is composed of gatekeeper representatives--college, district central office, and union personnel, defining themselves as experts. A couple of client representatives participate occasionally. This group carries out the primary planning work, both

through subcommittees, and in plenary sessions. An external "super-group" of three high-power gatekeepers is in principle supposed to deal with larger political issues, but in practice has served a vetoing function. The P/I group does not approach the future very directly, except through the medium of doing rather thorough designing, with emphasis on the over-all structure, groupings, and curriculum, including specific "teacher-proof" designing of various aspects of the school's program, keeping vividly in mind the bureaucratic constraints of the district, the college, and the union. The P/I group is currently faced with massive uncertainty about over-all budget, the timing of the new school's opening, the availability of a site, and even when a principal will be appointed. In the face of this, they have tended to become confused, find it difficult to be adaptive in response to such vagueness, and have left the question of planning-implementation linkage at the level of "get the best principal we can from the system and hand over the plans". Field workers on our project said of the P/I group:

> The contingencies and constraints feed into the committee and pull them apart, but they don't know what to deal with first. They don't know if they're on solid ground. ...No one is really managing the process...it's been trudging...they are terrible problem-solvers and everyone has his own agenda, maybe even his own planning model. No common agenda...Morris [a retired district planner] keeps coming back over and over again to his issues and often gets his way. I don't understand it, but they seem to have enough commitment to keep coming to meetings. The subcommittees keep working and producing. But the big group almost never buttons up an issue, and there's rarely a clear consensus.

These comments demonstrate one additional aspect of the reality we are studying: the P/I model (or models) being used by any particular P/I group operate through the realities of the social system of that group. Here we note lack of cohesiveness, inadequate leadership, missing group skills, absence of P/I tools for dealing with uncertainty, along with member commitment and a functioning division of labor for task production. Up to now we have been discussing P/I models as if they were being used in a vacuum by a standard group.

We also see that the basic relationship of the P/I group to its environment--especially in power terms--bears centrally on the P/I model in place. In the case of Campus High, the group's relative powerlessness vis-a-vis key decision-makers, and its inability to get assurances about needed resources are hampering its functioning severely, although its members individually have good political skills and understand the problems of dealing with environmental constraints.

InterArts. This experimental high school program for the arts will involve the collaboration of several suburban and one urban school district; students will attend it half days, with the other half day in their own high schools. Financing will be from the districts and the state. The P/I group membership is essentially gatekeepers and their representatives, who import experts from time to time to aid with their planning. Like Campus High, they use subgroups to carry out design work. But the design work so far, though carried out rather rationally, and managed competently by the general coordinator, has only involved a sort of "rough sketch"; the degree of specificity is quite low. The future has not been approached directly; they rarely if ever do anything like "what if" thinking. The reflexivity/adaptiveness dimension is not highly salient. The question of P/I linkage has not been addressed; the expectation is that the plans may be altered considerably when the director is hired, but mechanisms for continuity with him or her have not been proposed.

When asked in our project staff meeting why so much rational planning energy was resulting in so little firmed-up design work, a field worker mused:

> They've been working as a very cohesive group...they've decided general things like the school's structure, governance, relationships with sending schools, but nothing about program...they say program will really be the director's domain...the coordinator supplies very strong leadership and preparation for the P/I group; she even thinks the process is maybe too-closely managed.

Another staff member said:

> Maybe the real purpose of the planning and the "rough sketch" is not to alarm any major stakeholder, and incorporate everyone's ideas--it's a sort of pseudo-planning.

Field worker:

> It's a giant cooptation machine!

The discussion following this led us to the conclusion that the "semi-rational" P/I model being followed could be traced primarily to the P/I group's status as an arena in which many institutional interests with financial power over the enterprise were at play (thus the need to keep people on board and avoid "disownment"), and to the fact that it was completely unclear whether any of the planners would in fact become implementers. The "cooptation machine" explanation also helped us understand why there was little direct approach to the future, since serious analysis of contingencies was unnecessary if everyone could be kept on board.

Goodstock. This urban high school for careers in business had two different P/I models in place at different stages of the P/I process. During the early period, prior to the appointment of the principal, the P/I responsibilities were carried out by a single coordinator, defined essentially as an expert. She acted as an assembler and synthesizer of a wide range of other district experts' ideas, worked on resource acquisition (both money and equipment) and developed working contacts with gatekeepers in the district and surrounding business community. Design specificity was relatively high. Her approach to the future was relatively direct, and included not only design work but data collection on expected employment needs in the business community. Adaptation was not high-salient. The coordinator hoped and expected to be appointed principal (primary P/I linkage), but also designed a summer start-up in-service training program to insure carryover of her plans.

The coordinator, though a semi-finalist, was not appointed principal. The new principal's P/I model seemed largely composed of a determination to do things "right", and to do them smoothly; she defined herself and to some extent the assistant principals as the P/I group. She benefited from the active prior planning, and continued to work on highly-specific design aspects, and was reasonably direct in approaching the future (contingency plans for staffing, movement to a temporary site before the construction was complete for the new one). Her adaptation was within a very narrow range (was largely limited to warding off specific problems such as orderly passing in the halls), and P/I linkage was primarily through staffing recommendations, the summer training institute, and the planner's support in contacting key people. With all this, it seemed crystal clear that though the "letter" of the prior planning had been carried out, the "spirit" was lost (ex: the planner had envisioned an equalitarian, supportive teacher-pupil relationship, backing it up with the design proposal that there be no teachers' desks, and no separate teachers' toilets). Desks and separate toilets did, however, appear).

A field worker said:

> The planner's vision of the school was a place where there would be new social relationships and kids would have academic and occupational options...she had a real vision that kids themselves would develop an independence and self-responsibility. ...That's a lip-service ideal at the centr office, but she really meant it. Her vision of the kids and what she wanted them to be able to do was so much higher than what's going on now.

Our search for explanations for this unsuccessful outcome led us in several directions, none of them fully illuminating. We invoked the differing P/I models of the planner and the implementer; the implementers' lower ownership of the original vision; the inability of the planner to influence the selection of staff, with resulting uneven goal commitment by teachers; restrictions on the school's ability to select students, with resulting lowering of teachers' expectations for students. Perhaps most obviously: the planners' hopes for a "different" social climate could by definition not be installed from a distance, but could only be implemented (or defused/blocked) by the real actors on the scene. Perhaps the most banal explanation is the best: bureaucratic business as usual overtook the intent of the original design.

The reader may be as struck as we were by the fact that none of the three sites just reviewed seems to have a P/I model in place that fits any of the "classic" ones reviewed--with the possible exception of the "muddling through" one, if we use the popular definition. Reality is muddier than these models.

Predictions about Planning-implementation effectiveness

We are not far enough along in our project to have much confidence in predicting what makes for P/I effectiveness--the cluster of goal-congruent implementation, problem-coping and stakeholder satisfaction outlined earlier. But applying the five dimensions discussed earlier as a kind of diagnostic scheme to these three cases may be illuminating, and may suggest places where a "classic" model could profitably be tried.

We might speculate that Campus High, to be more effective, could use much more reflexivity/adaptiveness in relation to its internal functioning (a consultant partly supported by our project is now working on this), which might in turn aid it to be more proactive, and adaptive, toward its uncertain and threatening environment. Along with such a shift, it seems likely that increased use of P/I tools, especially those aimed at managing uncertainty, like scenario-writing, would be helpful. Until more movement along these lines occurs, real design specificity seems counter-productive.

Considering InterArts, it seems probable that strengthening the planning-implementation linkage is most crucial for making effectiveness more likely. Environmental support continues to be crucial, but the planners may well need to begin serious designing and building of the new school as a social

system. For InterArts, if environmental resources can be assured, some version of the "architect" P/I model might well be most appropriate--assuming that there are good linkages between planners and the new director and staff--perhaps through transfer of personnel. It is also possible, as planning gets more concrete, that simulating a typical day--using real artist-teachers and real students--would be helpful. Movement toward effectiveness seems likely since (a) our project has already heightened reflexivity by feeding back a summary report of our observations;[7] and (b) the InterArts planners are using external consultants with a P/I effectiveness emphasis.

At Goodstock (which after six months in a temporary site is on the brink of a move to their new building with attendant hope and anxiety) it is not clear how much P/I effectiveness can be enhanced, in the face of uncertain ownership of the original vision, and the bureaucratic work style of the school. It is possible that increased reflexivity (feedback of data collected by our project from teachers, parents, and students is impending) will aid the principal and key assistants to be clearer about actual goal commitment, to locate trouble spots in the system, and to be more broadly adaptive than has been the case so far. Some more direct attention to the longer-run future (2 to 3 years) might be productive in clarifying opportunities for redesign (which appear to be diminishing). Whether this will happen is in doubt, since Goodstock has chosen not to use external consulting help, a feature that might have increased awareness of the possibilities we outline here.

These speculations illustrate and lead to several generalizations about P/I effectiveness and its precursors.

1. Prescriptions for increasing P/I effectiveness are of necessity site-specific. The diagnoses above essentially examined our five dimensions, and suggested interventions or emphases that would strengthen weaker ones.

2. "Classic" models may or may not be relevant to a particular site's needs, and are probably mainly of heuristic value.

3. If any dimensions are more central or critical than others, they probably are reflexivity/adaptiveness, and P/I linkage. The first enables steady self-correction and learning by P/I members, and the second bridges the two core activities needed to get a new school in place effectively. We

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[7] Though our project is essentially documentary in emphasis, our contracts with schools do specify periodic non-evaluative reports from us to P/I groups--the effects of which we of course try to document carefully.

cannot assume that "high" or extreme loadings on these two dimensions are necessarily associated with high effectiveness (ex: linkage may be so close as to create a walled-off P/I group that ignores data from the environment, or adaptiveness may become self-deluding expediency).

4. There may be background or contextual conditions which considerably affect the issue of the most appropriate or effective P/I model for a particular site. For example, we believe that the more innovative the intentions of the P/I group, the more P/I energy will be required, particularly in the dimensions of design specificity and reflexivity. Or, the higher the environmental uncertainty, the more direct the P/I group's approach to the future will have to be.

5. We might conclude with the observation that P/I effectiveness will probably not be enhanced by an insistence that its non-rational aspects be minimized. Here are two quotes, the first from a poet, the second from a planner.

> We should carefully survey the reality before us to size up its measurable and so to speak mechanical sector, that part of it which would eventually admit of statistical-mechanical solutions, and this done, limit the rigid part of our planning to that sector; than organise the rest so as to marshall, guide and coordinate the free, spontaneous creativeness of institutions and individuals, allowing for their qualities, differences, experience, traditions, hopes and even, when not uncooperative, prejudices; thus aiming as best we can at a happy alliance of the craving of thought for definiteness and the no less craving of life for the indefinite and the unexpected: the wall and the rose on the wall.
>
> (deMadariaga, 1969)

> Can planning ever become an exact science and, if it can, would we be satisfied with it? The attitude of men to planning is as ambivalent as it is to the future. We dread the uncertainties of the future, but we should hate to know it exactly, in advance. Man cannot live without hope, and hope means uncertainty.
>
> (Gabor, 1969)

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